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L4: Entry 26 of 29 File: USPT Oct 3, 1989

DOCUMENT-IDENTIFIER: US 4871768 A
TITLE: Dietary supplement utilizing .omega.-3/medium chain trigylceride mixtures

Abstract Paragraph Left (1):
A new dietary supplement has been developed which yields the benefits of both .omega.3 oils and medium chain triglycerides for lipid nutrition. A structured lipid containing .omega.3 fatty acids and medium chain fatty acids is also disclosed.

Brief Summary Paragraph Right (1):
The field of lipid nutrition, including the public awareness of dietary modifications, has undergone a great number of changes in the last few years. Many people have replaced complex, saturated animal fats in their diets by polyunsaturated vegetable fats for health reasons, particularly in an attempt to control serum cholesterol levels. Most recently, fish oils have been suggested as a dietary supplement for cholesterol and triglyceride control and antithrombotic benefits. In addition, medium chain triglycerides ("MCT"), eight (C.sub.8)and ten (C.sub.10) carbon fatty acids bound to a glycerol backbone, have been used on an experimental basis, primarily in hospitals, as a nutrition source because of their rapid uptake and utilization by the body. Additional experimental work has been conducted with structured lipids, e.g., U.S. Pat. No. 4,528,197. However, none of these nutritional programs have been a panacea; there have been numerous problems with absorption of the fatty acids into the body and/or health problems in patients. These problems occur, in part, because of the type of fatty acid mixture chosen. Accordingly, there still remains a need for a better lipid nutrition supplement.

Brief Summary Paragraph Right (9):
While calories are important in the diet of a severely stressed patient, the form that calories are supplied in plays a significant role because carbohydrate energy sources, as opposed to fat sources, stimulate insulin release. Insulin release can be harmful in stress states because of problems with insulin resistance. Complications caused by excess carbohydrate content in the diet can include fatty liver, hyperglycemia, and respiratory failure due to excess carbon dioxide production. Usually 30 to 50% of the dietary calories should come from dietary fat to minimize these risks but if long chain fats, particularly having a chain length of sixteen carbons or greater, are used in this quantity, they are cleared very slowly from the circulation and can block the reticuloendothelial system. However, MCT's and structured lipids of MCT and LCT's provide additional fat calories and are rapidly cleared so there is no difficulty with the reticuloendothelial system. Further, and very importantly, the MCT's do not act as substrates for prostaglandin synthesis.

Brief Summary Paragraph Right (15):
The present invention features a synthetic triglyceride (equivalent to structured lipid) which provides a high energy fat source and fatty acids which assist in fighting infection and atherosclerotic problems. The synthetic triglyceride has a glycerol backbone with three fatty acids linked thereto, with either one or two of said fatty acids being .omega.3 fatty acids and the remainder being fatty acids selected from a group consisting of caprylic acid (C.sub.8), capric acid (C.sub.10) and mixtures thereof. The preferred synthetic triglyceride has two caprylic or capric fatty acids and one long chain .omega.3 fatty acid. A most preferred synthetic triglyceride is a rearranged structured lipid which has the two caprylic or capric fatty acids on adjacent carbons of the glycerol backbone. Sources for the .omega.3 fatty acids are plant oils, marine plankton, fungal oils, and fish oils, preferably

menhaden, salmon, anchovy or herring oils. The synthetic triglyceride can be replaced by a physical mixture of long chain .omega.3 fatty acids and MCT's with similar effects.

Brief Summary Paragraph Right (18):
Another feature of the invention is a dietary supplement comprising 10 to 40% of an oily lipid fraction which has 50 to 90% by weight of medium chain fatty acids and 10 to 50% by weight of .omega.3 fatty acids. The supplement also may contain 1 to 2% by weight of an emulsifier, 1 to 3% of an osmolality modifier, and sterile water. The oily lipid fraction can be a physical mixture of the medium chain triglycerides and triglycerides rich in .omega.3 fatty acids or can be a rearranged structured lipid or synthetic triglyceride as previously described. The preferred emulsifiers are egg yolk phospholipids and soybean phospholipids while the preferred osmolality modifier is glycerol. The lipid fraction may also contain a fraction of .omega.9 fatty acids, particularly those oils rich in oleic acid, preferably high oleic safflower oil, high oleic sunflower oil, olive oil or canola oil.

Detailed Description Paragraph Right (2):
This Example illustrates a diet based on a structured lipid of the present invention that can improve effectiveness against infection as compared with a conventional diet based on safflower oil. The structured lipid diet of the invention provides benefits in combating infection while providing excellent nutrition.

Detailed Description Paragraph Right (3):
Table 1 lists the ingredients for a diet which is useful as a guinea pig demonstration diet. The oil fraction contained 145 grams of the MCT/menhaden .omega.3-structured lipid and 5 grams of safflower oil to prevent linoleic acid deficiency. This is a standard Reid-Briggs guinea pig diet except the oil content was raised so that the diet contains 15% by weight of lipid as opposed to the traditional 7.3%. Thirty-six percent of the dietary calories are lipid derived as compared with 15% in standard diets.

Detailed Description Paragraph Right (4):
The MCT/menhaden .omega.3-structured lipi can be was made using standard procedures. The most common procedure uses sodium methylate as a catalyst for the interesterification reaction, forming the structured lipid. Because water "poisons" the sodium methylate catalyst, it is first necessary to dry the fats and/or oils used in the process. This is normally carried out by heating the fats to a temperature of 120-150.degree. C. while under vacuum.

Detailed Description Paragraph Right (6):
Table 2 illustrates the specific fatty acid content of a standard safflower oil control diet and the MCT/menhaden oil .omega.3-structured lipid diet. The MCT diet contains more then 50% of its oil as C.sub. 8-C.sub. 10 fatty acids while the safflower oil control diet has none. Additionally, the safflower oil diet lacks the long chain polyunsaturated .omega.3 fatty acids, eicosapentaenoic and docosahexaenoic acids.

Detailed Description Paragraph Right (9):
The oil emulsion is made as follows. For each liter of emulsion, 100-300 gm of MCT/menhaden .omega.3-structured lipid is mixed with 11 gms of an emulsifier, e.g., egg yolk phospholipids USP, 22.5 gms of an osmolality modifier, e.g., glycerin USP, and sterile water USP to bring the volume to a liter. Specifically, the oil is added to a high shear mixer such as a Waring blender with steel blades operated at 1,600 RPM. The phospholipids are added slowly to the oil and mixed at high speed for six minutes. Sterile water is added to make a final volume of one liter in a steady stream to the phospholipid and oil mixture and emulsified for twenty minutes at 1,600 RPM. The attainment of the oil-in-water emulsion is confirmed by the "drop dispersion test". Emulsification is continued until the coarse oil emulsion disperses freely in water but not in oil.

Detailed Description Paragraph Right (13):
While the method and dietary supplement disclosed herein will not necessarily prevent the onset of infection caused by these agents, it will promote survival of infected patients or animals. The use of a MCT/.omega.3-structured lipid incorporating

.omega.3 fatty acids provides not only the .omega.3 benefits of promoting survival to infection but also the enhanced benefit of providing easily absorbed calories from the MCT's which do not promote insulin secretion as would a carbohydrate energy source. Further, the use of the MCT's together with the .omega.3 oils seem to promote the absorption and sparing of the .omega.3 oils.

CLAIMS:

4. The synthetic triglyceride of claim 3 comprising a rearranged structured lipid.

9. The method of claim 8 wherein said synthetic triglyceride has said .omega.3 fatty acid being in a central position on said glycerol backbone and comprises a rearranged structured lipid.

24. The dietary supplement of claim 23 wherein said synthetic triglycerides comprises a rearranged structured lipid.

L4: Entry 23 of 29 File: USPT Nov 2, 1993

DOCUMENT-IDENTIFIER: US 5258197 A
TITLE: Reduced calorie triglyceride mixtures

Detailed Description Paragraph Right (29):
Some preparative procedures for triglycerides bearing short and long substituents have been published. Interesterification of a shortening basestock with triacetin yielded an improved plastic product (though all the Examples employed partially, not fully, hydrogenated basestocks; see U.S. Pat. No. 2,614,937 to Baur and Lange). Acetylated monoglycerides have been discussed above. An acetylated monoglyceride prepared from lard, cottonseed oil or partially hydrogenated vegetable oil has been disclosed as useful in lowering cholesterol (U.S. Pat. No. 4,272,548 to Gatzen, et al.). Triglycerides bearing palmitic and butyric residues were synthesized for study as pancreatic lipase and human milk bile lipase substrates (in Clement, G., et al., Biochem. Biophys. Res. Commun. 8: 238-242 (1962) and Wang, C. S., et al., cited previously, respectively).

Detailed Description Paragraph Right (71):
In the practice of formulating margarines according to this embodiment, effective amounts of low calorie triglycerides are mixed with edible oils to yield structured lipid compositions. By the term "edible oil" is meant any natural or synthetic lipid, or mixtures of such lipids, which flow at 20.degree. C. and are suitable for use in human foods. Preferred edible oils are liquid at 20.degree. C., with many embodiments liquid at 25.degree. C. Preferred margarine fat compositions contain 1 to 95%, preferably 5 to 75%, low calorie fats and 5 to 95%, preferably 25 to 95%, edible oil.

Detailed Description Paragraph Right (73):
An advantage of the invention is that the margarines prepared using the low calorie triglycerides of this invention can be formulated so the resulting compositions are trans-free. Most natural fats and oils contain only cis double bonds, but partial hydrogenation results in the formation of trans fatty acids, which have been recently shown to raise low density lipoprotein serum cholesterol levels and to lower high density lipoprotein serum cholesterol levels in adults fed fats having these acids (Mensink, R. P., and Katan, M. B., New Eng. Jour. Med., 323: 439-445 (1990)). Since this invention employs natural oils and fully hydrogenated oils, these isomers can be eliminated from the food products.

L4: Entry 22 of 29 File: USPT Feb 22, 1994

DOCUMENT-IDENTIFIER: US 5288512 A
TITLE: Reduced calorie fats made from triglycerides containing medium and long chain fatty acids

Brief Summary Paragraph Right (7):
U.S. Pat. No. 4,528,197 of Blackburn, issued Jul. 9, 1985, discloses a composition for enhancing protein anabolism in an hypercatabolic mammal. The composition is made of a nutritionally sufficient source of amino acids, carbohydrates and lipids, the lipids comprising a controlled triglyceride source which, on hydrolysis, yields both long chain fatty acids and medium chain fatty acids. One such fatty acid source disclosed is a structured lipid containing medium chain fatty acids (saturated C.sub.8, C.sub.10, and C.sub.12), and essential fatty acids.

Brief Summary Paragraph Right (67):
Many benefits are obtained from the use of the present reduced calorie fats in food and beverage compositions, either when used alone or in combination with the ingredients discussed above. A primary benefit is the calorie reduction achieved when the fat is used as a total or partial fat replacement. This calorie reduction can be increased by using combinations of the present fats with reduced calorie sweeteners, bulking agents, or other reduced calorie or noncaloric fats. Another benefit which follows from this use is a decrease in the total amount of fats in the diet. Foods or beverages made with the reduced calorie fats instead of triglyceride fats will also contain less cholesterol, and the ingestion of these foods can lead to reduced serum cholesterol and thus reduced risk of heart disease.

Brief Summary Paragraph Right (69):
Dietary foods can be made with the reduced calorie fats to meet special dietary needs, for example, of persons who are obese, diabetic, or hypercholesterolemic. The reduced calorie fat can be a major part of a low-fat, low-calorie, low-cholesterol diet, and they can be used alone or in combination with drug therapy or other therapy. Combinations of food or beverage products made with the reduced calorie fat can be used as part of a total dietary management regimen, based on one or more of these products, containing the reduced calorie fat alone or in combination with one or more of the above-mentioned ingredients, to provide one or more of the above-mentioned benefits.

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☐ 29. Document ID: JP 2646272 B2, WO 8909596 A, AU 8934309 A, US 4952606 A, EP 449819 A, JP 03504868 W, CA 1330633 C, EP 449819 B1, DE 68919712 E, EP 449819 A4

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